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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/930,007	08/14/2001	James William Otter	60246-141/9700	9100

26096 7590 06/21/2004

CARLSON, GASKEY & OLDS, P.C.
400 WEST MAPLE ROAD
SUITE 350
BIRMINGHAM, MI 48009

EXAMINER	
PIAZZA CORCORAN, GLADYS JOSEFINA	
ART UNIT	**PAPER NUMBER**
1733	

DATE MAILED: 06/21/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/930,007	OTTER, JAMES WILLIAM	
	Examiner	Art Unit	
	Gladys J Piazza Corcoran	1733	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 April 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 and 3-27* is/are pending in the application.

4a) Of the above claim(s) *7-9 and 12-20* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-6,10,11 and 21-27* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. The finality of the prior Office Action filed on October 7, 2003 is now withdrawn.

Election/Restrictions

2. Claims 7-9 and 12-20 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected Group II, Species IB, II and III, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on September 27, 2002.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Winter et al. (US Patent No. 5,696,045) in view of Scholl (US Patent No. 3,648,768).

It is known to form heat transfer units from norbornene polymer. Winter discloses it is known to form a heat transfer component (heat exchanger; column 2, lines 6-20; column 11, lines 20-30) of a norbornene polymer (column 10, lines 27-35).

However, Winter does not specifically disclose how the heat transfer component is formed. It is noted that Winter does disclose that the norbornene polymer is known to be used to form extruded pipes and blow molded articles (column 11, lines 20-30). It is well known in the art to form heat transfer components (heat exchangers) by forming a plurality of cells of a polymer by melting and hot extruding the polymer to form at least

one extruded tube and using the cells to form the heat transfer component. For example, Scholl discloses an example of forming a heat exchanger (heat exchanger block) by forming a plurality of cells (heat exchanger units) of a polymer by melting the polymer and hot extruding the polymer to form at least one extruded tube (column 2, lines 25-30, 54-61) and using the cells as part of the heat exchanger (column 1, lines 65-70). It would have been obvious to one of ordinary skill in the art at the time of the invention to form the norbornene heat exchanger as shown by Winter in a conventional manner such as forming cells with at least one extruded tube as exemplified by Scholl.

5. Claims 3, 5, 6, 21, 22, 24-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Winter et al. in view of Scholl as applied to claim 1 above, and further in view of Johnson (US Patent No. 3,426,841) as taken with Nakagawa (US Patent No. 4,362,688).

It is well known in the heat exchanger art to provide U-shaped tubes as an equivalent alternative to straight tubes in the cells of a heat exchanger. Johnson discloses an example of a method of forming heat exchangers where a plurality of U-shaped tubes are formed as an equivalent alternative to a plurality of straight tubes. It is also well known in the art of forming tubes of complex shapes, such as U-shaped tubes, to blow mold extruded tubes by first extruding the tubes and then expanding the tubes with air in molds in order to form the complex shapes. For example, Nakagawa discloses it is conventionally known to form thermoplastic tubes of complex shapes by extruding the tubes, then expanding the tubes with air in molds to form the complex shaped tubes (column 1, lines 40-55; column 4, lines 20-45). It is noted that Applicant

in the Specification admits that the methods of forming the tubes are of conventional blow molding and extrusion methods (Specification [4] and [39]). It would have been obvious to one of ordinary skill in the art at the time of the invention to form the norbornene heat exchanger as shown by Winter and Scholl by providing U-shaped tubes as an equivalent alternative to straight tubes as shown by Johnson and forming the tubes in a conventional manner such as extruding tubes and expanding in molds with air in order to form the U-shaped tubes as exemplified by Nakagawa.

As to claim 5, the ends of the tubes are attached to a flange in both Scholl and Johnson, the smaller U-shaped tubes are located in openings defined by the pair of ends of the larger U-shaped tubes and a flue gas passages is defined between the U-shaped tubes in Johnson (as is also conventional). As to claim 6, Scholl and Johnson both attach the ends of a tube to a flange. Johnson further discloses that the parts in the heat exchanger are formed of the same or similar materials in order to fuse together the parts of the heat exchanger together. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to form the flange of the heat exchanger as shown by Winter, Scholl, Johnson and Nakagawa out of the same material as the tubes (norbornene) in order to thermally adhere (fuse) together the flange to the tubes as exemplified by Johnson. As to claim 21, Nakagawa discloses that the molds have a bottom and top portion and the extruded tubes are positioned in the bottom portion of the molds and the top portion of the molds are placed on the bottom portion to retain the extruded tube there between. As to claim 22, the U-shaped tubes are all continuous between the pairs of ends.

As to claim 24, as discussed above, Winter discloses it is known to form heat transfer components out of norbornene polymer; Scholl discloses it is known to form heat transfer components by forming a plurality of cells of a polymer and using the cells as part of the heat transfer component; Johnson discloses each of the cells include a plurality of U-shaped tubes with a pair of ends that define an opening, the tubes are continuous between the ends and a first tube is located within the opening of a second tube; and Nakagawa discloses it is known to form tubes of complex shapes by expanding the tubes. As to claim 25, a flue gas passage is defined between the tubes in Johnson and as is considered conventional. As to claim 26, the ends of the tubes are attached to a flange in both Scholl and Johnson. As to claim 27, Scholl and Johnson both attach the ends of a tube to a flange. Johnson further discloses that the parts in the heat exchanger are formed of the same or similar materials in order to fuse together the parts of the heat exchanger together. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to form the flange of the heat exchanger as shown by Winter, Scholl, Johnson and Nakagawa out of the same material as the tubes (norbornene) in order to thermally adhere (fuse) together the flange to the tubes as exemplified by Johnson.

6. Claim 4, 10, 11, 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Winter et al., Scholl, Johnson, and Nakagawa as applied to claims 3, 5 above, and further in view of Togashi (US Patent No. 4,245,697).

It is well known in the heat exchanger art to provide tubes for heat exchangers with a plurality of tube grooves in order to increase the heat transfer properties of the

tube. Togashi discloses one example of providing heat exchanger tubes with grooves on the outer surface of the tubes in order to improve the heat conduction efficiency of the fluid flowing (column 1, lines 10-31). It is noted that Togashi discloses that the grooves on the tubes are formed as an improvement over providing fins on the outer surfaces of the tubes. It is further noted that in the method of forming tubes as discussed above with Nakagawa, it is known to provide grooves on the inner surfaces of the molds in order to form grooves in the tubes (column 3, lines 45-50). It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the method of forming a heat transfer component as shown by Winter, Scholl, Johnson, and Nakagawa by providing grooves on the surfaces of the molds for forming the tubes as shown by Nakagawa in order to provide the tubes with grooves as conventionally known in the art in order to improve the heat transfer characteristics as exemplified by Togashi.

As to claim 10, all the limitations of the claim have been addressed as discussed above in reference to claims 4, and 5 above. As to claim 11, the limitations of the claim have been addressed as discussed above in reference to claim 6 above. As to claim 23, a second at least one cell is provided in Scholl and an air flow passage is defined between the cells as is considered conventional.

7. Claims 10, 11, 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Winter et al. (US Patent No. 5,696,045) in view of Johnson (US Patent No. 3,426,841) as taken with Nakagawa (US Patent No. 4,362,688) and further in view of Togashi (US Patent No. 4,245,697).

It is known to form heat transfer units from norbornene polymer. Winter discloses it is known to form a heat transfer component (heat exchanger; column 2, lines 6-20; column 11, lines 20-30) of a norbornene polymer (column 10, lines 27-35).

However, Winter does not specifically disclose how the heat transfer component is formed. It is noted that Winter does disclose that the norbornene polymer is known to be used to form extruded pipes and blow molded articles (column 11, lines 20-30). It is well known in the art to form heat transfer components (heat exchangers) by forming a plurality of U-shaped tubes and attaching the tubes to a flange to form a cell. Johnson discloses an example of a method of forming heat exchangers where a plurality of U-shaped tubes are formed and attached to a flange and the smaller U-shaped tubes are located within the opening defined between the ends of the larger U-shaped tubes and a flue gas passage containing a flue gas is defined between the tubes (column 3, line 71 to column 4, line 26). It is also well known in the art of forming tubes of complex shapes, such as U-shaped tubes, to blow mold extruded tubes by first extruding the tubes and then expanding the tubes with air in molds in order to form the complex shapes. For example, Nakagawa discloses it is conventionally known to form thermoplastic tubes of complex shapes by melting the polymer and hot extruding to form the tubes, then expanding the tubes with air within molds to form the complex shaped tubes (column 1, lines 40-55; column 4, lines 20-45). It is noted that Applicant in the Specification admits that the methods of forming the tubes are of conventional blow molding and extrusion methods (Specification [4] and [39]). It would have been obvious to one of ordinary skill in the art at the time of the invention to form the

norbornene heat exchanger as shown by Winter by forming the heat exchanger in a conventional manner such as providing U-shaped tubes to form a cell as shown by Johnson and forming the tubes in a conventional manner such as extruding tubes and expanding in molds with air in order to form the U-shaped tubes as exemplified by Nakagawa.

It is well known in the heat exchanger art to provide tubes for heat exchangers with a plurality of tube grooves in order to increase the heat transfer properties of the tube. Togashi discloses one example of providing heat exchanger tubes with grooves on the outer surface of the tubes in order to improve the heat conduction efficiency of the fluid flowing (column 1, lines 10-31). It is noted that Togashi discloses that the grooves on the tubes are formed as an improvement over providing fins on the outer surfaces of the tubes. It is further noted that in the method of forming tubes as discussed above with Nakagawa, it is known to provide grooves on the inner surfaces of the molds in order to form grooves in the tubes (column 3, lines 45-50). It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the method of forming a heat transfer component as shown by Winter, Johnson, and Nakagawa by providing grooves on the surfaces of the molds for forming the tubes as shown by Nakagawa in order to provide the tubes with grooves as conventionally known in the art in order to improve the heat transfer characteristics as exemplified by Togashi.

As to claim 11, Johnson discloses forming the flange (tube sheets) out of similar materials as the tubes in order to fuse to parts together. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to form the flange of

the heat exchanger as shown by Winter, Johnson and Nakagawa out of the same material as the tubes (norbornene) in order to thermally adhere (fuse) together the flange to the tubes as exemplified by Johnson.

As to claim 23, it is considered conventional in the art to form multiple cells of heat exchanger components to define an airflow passage between the cells.

8. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Winter et al. (US Patent No. 5,696,045) in view of Rhodes et al. (US Patent No. 5,979548).

It is known to form heat transfer units from norbornene polymer. Winter discloses it is known to form a heat transfer component (heat exchanger; column 2, lines 6-20; column 11, lines 20-30) of a norbornene polymer (column 10, lines 27-35).

However, Winter does not specifically disclose how the heat transfer component is formed. It is noted that Winter does disclose that the norbornene polymer is known to be used to form extruded pipes and blow molded articles (column 11, lines 20-30).

It is known in the art to form heat exchangers by forming a plurality of cells of polymer tubes and using the cells as part of a heat transfer component. For example, Rhodes discloses forming a heat transfer component from polymeric tubes forming a plurality of cells (column 3, lines 1-25). However, Rhodes does not specifically disclose how the tubes are formed. It is considered conventional to form polymeric tubes by melting and extruding the polymer. It would have been obvious to one of ordinary skill in the art at the time of the invention to form the norbornene heat exchanger as shown by Winter in a conventional manner such as forming cells of thermoplastic tubes as

shown by Rhodes where the tubes are formed in a conventional manner such as extrusion.

9. Claims 1, 3-6, 10, 11, 21-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Winter et al. in view of Rhodes et al. as applied to claim 1 above, and further in view of Nakagawa (US Patent No. 4,362,688).

As to claims 1 and 3, Rhodes discloses the tubes are thermoplastic polymer and U-shaped tubes (column 7, lines 18-28), however does not specifically disclose how the tubes are formed. It is well known in the art of forming tubes of complex shapes, such as U-shaped tubes, to blow mold extruded tubes by first extruding the tubes and then expanding the tubes with air in molds in order to form the complex shapes. For example, Nakagawa discloses it is conventionally known to form thermoplastic tubes of complex shapes by extruding the tubes, then expanding the tubes with air in molds to form the complex shaped tubes (column 1, lines 40-55; column 4, lines 20-45). It is noted that Applicant in the Specification admits that the methods of forming the tubes are of conventional blow molding and extrusion methods (Specification [4] and [39]). It would have been obvious to one of ordinary skill in the art at the time of the invention to form the norbornene heat exchanger as shown by Winter and Rhodes by forming the U-shaped tubes in a conventional manner such as extruding tubes and expanding in molds with air in order to form the U-shaped tubes as exemplified by Nakagawa.

As to claim 4, Rhodes discloses the tubes have grooves on the outer surfaces (column 3, lines 15-20) and discloses the grooves are formed by pressing dies on the outer surfaces of the tubes or other known methods of forming grooves (indentations).

While it is not clear whether the grooves in Rhodes are formed when expanding the tubes in molds, it is considered well known and conventional to form grooves on the outer surfaces of tubes when expanding in molds. For example, Nakagawa discloses providing grooves on the inner surfaces of the molds in order to form grooves in the tubes (column 3, lines 45-50). It would have been obvious to one of ordinary skill in the art at the time of the invention to form the heat exchanger as shown by Winter and Rhodes by forming the grooves on the outer surfaces of the tubes while expanding the tubes in molds as is considered conventional in the art and exemplified by Nakagawa as a way of reducing the number of method steps required.

As to claim 5, Rhodes discloses forming a plurality of U-shaped tubes with ends that are attached to a flange (column 29-34) to form a cell and a set of the U-shaped tubes are located within an opening of a set of U-shaped tubes defined between the ends (see figure 9) and a flue gas passages is defined between the tubes (column 1, lines 8-13). As to claim 6, Rhodes discloses thermally adhering (welding) the tube ends to the flange, however does not specifically disclose the material of the flange. It would have been well within the purview of one of ordinary skill in the art at the time of the invention to form the flange out of the same material as the tubes in order to weld the materials together, only the expected results would be attained.

As to claim 10, all the limitations of the claim have been addressed as discussed above in reference to claims 4, and 5 above. As to claim 11, the limitations of the claim have been addressed as discussed above in reference to claim 6 above. As to claim 21, Nakagawa discloses that the molds have a bottom and top portion and the extruded

tubes are positioned in the bottom portion of the molds and the top portion of the molds are placed on the bottom portion to retain the extruded tube there between. As to claim 22, the U-shaped tubes are all continuous between the pairs of ends. As to claim 23, a second at least one cell is provided in Rhodes (each pair of U-shaped tubes in the array of tubes) and an air flow passage is defined between the cells as is also considered conventional.

As to claim 24, as discussed above, Winter discloses it is known to form heat transfer components out of norbornene polymer; Rhodes discloses it is known to form heat transfer components by forming a plurality of cells (array of tubes) of a polymer and using the cells as part of the heat transfer component, each of the cells include a plurality of U-shaped tubes with a pair of ends that define an opening, the tubes are continuous between the ends and a first tube is located within the opening of a second tube; and Nakagawa discloses it is known to form tubes of complex shapes by expanding the tubes. As to claim 25, a flue gas passage is defined between the tubes in Rhodes and also is considered conventional. As to claim 26, the ends of the tubes are attached to a flange in Rhodes as discussed above. As to claim 27, the limitations of the claim have been addressed as discussed above in reference to claim 6 above.

10. Claims 6, 11, 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Winter et al. in view of Rhodes et al. and Nakagawa as applied to claims 5, 10, 26 above, and further in view of Johnson (US Patent No. 3,426,841).

Rhodes discloses thermally adhering (welding) the tube ends to the flange, however does not specifically disclose the material of the flange. It would have been

well within the purview of one of ordinary skill in the art at the time of the invention to form the flange out of the same material as the tubes in order to weld the materials together, only the expected results would be attained. Johnson is cited to further show that it is known in the art to form flanges for heat exchangers out of the same material as the tubes in order to fuse the parts together. It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the heat exchanger as shown in Winter, Rhodes and Nakagawa by forming the flange out of norbornene in order to properly fuse the flange to the tubes as would be considered well within the purview of one of ordinary skill in the art and further exemplified by Johnson in order to properly fuse the parts together.

Response to Arguments

11. Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection.

It is noted that Applicant argues in reference to claims 5, 10 and 24 that the previous references do not show providing a straight pipe within an opening of the U-shaped pipes. However, none of the claims require that the first pipe within the opening of a second pipe must be straight. The claims as currently written do not exclude providing a U-shaped pipe within an opening of another U-shaped pipe when attached to a flange as shown in the newly cited references (Johnson and Rhodes).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gladys J Piazza Corcoran whose telephone number is

(571) 272-1214. The examiner can normally be reached on M-F 8am-5:30pm (alternate Fridays off).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Crispino can be reached on (571) 272-1226. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Gladys J.P. Corcoran
Examiner
Art Unit 1733

GJPC